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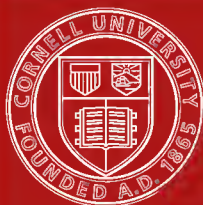
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The Commonwealth of Massachusetts.

REPORT

OF THE

COMMISSION ON THE INVESTIGATION

OF

AGRICULTURAL EDUCATION.

*Massachusetts, Special Commission for an
Investigation of Agricultural Education
at the Massachusetts Agricultural College*

JANUARY, 1918.

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The Commonwealth of Massachusetts.

REPORT ON THE INVESTIGATION OF AGRICULTURAL EDUCATION.

*To the Honorable Senate and House of Representatives of the Commonwealth
of Massachusetts.*

The Commission to investigate Agricultural Education at the Massachusetts Agricultural College and the development of the agricultural resources of the Commonwealth, — authorized by a resolve of the General Court in the year 1916, and by a subsequent resolve in 1917 granted an extension of time until Jan. 9, 1918 — respectfully submits the following report.

The resolve is as follows: —

CHAPTER 106.

RESOLVE PROVIDING FOR AN INVESTIGATION BY A SPECIAL COMMISSION OF
AGRICULTURAL EDUCATION AT THE MASSACHUSETTS AGRICULTURAL
COLLEGE AND THE DEVELOPMENT OF THE AGRICULTURAL RESOURCES OF
THE COMMONWEALTH.

Resolved, That a special commission is hereby established, to be composed of the commission on economy and efficiency, the commissioner of education, and three persons to be appointed by the governor, with the advice and consent of the council, for the purpose of investigating the subject of agricultural education as conducted at the Massachusetts Agricultural College and the development of the agricultural resources of the commonwealth.

The commission shall investigate and report as to the advisability of further expenditures for new buildings, additional equipment, the purchase of land and other improvements at the Massachusetts Agricultural College; as to the present policy of the college, with a view to ascertaining whether the college is meeting in the fullest degree the needs of the commonwealth in respect to agricultural training; as to the use of state and federal appropriations and grants; as to the operation of the farm department; as to the educational and academic instruction, and as to

the extension work. The commission shall ascertain to what extent teachers are engaged in activities other than college instruction; to what extent students are taught practical farming; to what extent the college, independently of other agencies, contributes toward farming and agricultural development; to what extent the lands, buildings and equipment may economically be utilized; and the relative cost per capita for the education of state and out-of-state students in the various courses of instruction, including comparisons with other agricultural institutions. The commission shall distinguish the educational from the other activities of the college; shall estimate the cost of possible future development of the college, both for initial appropriations and for maintenance; shall consider the elimination of certain activities, and a revision of the courses of study in respect to the character of the studies, the amount of time devoted to them, and otherwise. The commission shall ascertain what return, if any, in respect to the agricultural activities of the people of the commonwealth, is made by graduate state-educated students, and what benefits, if any, might accrue to the welfare or development of agriculture in the commonwealth by a co-ordination of the Massachusetts Agricultural College, the state board of agriculture, the forestry department and the department of animal industry, or any of them, in order that certain obvious existing duplications and overlappings of activity may be eliminated, and that the work of the said departments may be done more effectively and economically.

The commission shall report what operations connected with agriculture, the expenses of which are paid by the state, can best be carried on at the college rather than under the direction of the board of agriculture, and what operations now carried on at the college can better be performed under the direction of the board of agriculture.

The commission shall further report whether for the advancement of agriculture in Massachusetts it is advisable that the college be continued as at present organized.

The commission shall give public hearings, and shall be allowed for necessary expenses such sums, not exceeding seventy-five hundred dollars, as may be approved by the governor and council. The commission shall report in print on or before the tenth day of January, nineteen hundred and seventeen, and shall include in its report drafts of any bills necessary to carry out its recommendations. [*Approved May 19, 1916.*]

THE COMMISSION AND ITS ORGANIZATION.

By a later act the Supervisor of Administration succeeded the Commission on Economy and Efficiency. The *ex-officio* members of the Commission designated by the Legislature were, accordingly, Charles E. Burbank, Supervisor of Administration, and Payson Smith, Commissioner of Education. The three

members appointed by His Excellency the Governor in August were L. Clark Seelye of Northampton, Warren C. Jewett of Worcester, and William F. Whiting of Holyoke.

On Aug. 21, 1916, the Commission assembled in Boston for a preliminary discussion of the work to be undertaken and the methods to be followed.

On Sept. 5, 1916, the Commission met and formally organized, by the election of L. Clark Seelye as permanent chairman and Payson Smith as permanent secretary.

METHODS OF INVESTIGATION.

In accordance with the requirement of the resolve public hearings were held as follows: —

- Oct. 4, 1916, Massachusetts Agricultural College, Amherst.
- Oct. 13, 1916, State House, Boston.
- Oct. 19, 1916, Municipal building, Springfield.
- Oct. 24, 1916, State House, Boston.

Notices of the public hearings were sent to the newspapers, to every member of the State Board of Agriculture, to every president of an agricultural society in the State, to the master of every grange in the State, and to names given by the master of the State Grange, the president of the Massachusetts Agricultural College and others.

At all meetings an invitation was extended to those interested to send to the Commission written statements relative to the matters under investigation.

Conferences were held with the trustees and the faculty of the Massachusetts Agricultural College.

Extended conferences were also held with representatives of the Board of Agriculture, the State Forester, Department of Animal Industry, members of the Massachusetts Agricultural Development Committee, the director of the extension service, agents of county leagues and farm bureaus, and representative florists and market gardeners.

Visits were made to county agricultural schools and to the agricultural department of high schools by individual members of the Commission.

On Oct. 18, 1916, the Commission visited the college for the purpose of inspecting the grounds and buildings, and on Jan. 23, 1917, to inspect the buildings and equipment more thoroughly.

Visitations were also made by individual members of the Commission to inspect the buildings, the work of the college in the field and classroom, and extended conferences were held with officers of the institution, graduates and undergraduates.

A committee was sent to Washington to confer with the presidents and deans assembled at the annual conference, Nov. 15 to 17, 1916, of the American Association of Agricultural Colleges and Experiment Stations. The committee attended the sessions of that conference and had interviews with most of the presidents and deans present. Interviews were also had with members of the United States Bureau of Education and of Agriculture, and the Commission received from them valuable suggestions concerning the management of the college.

A questionnaire was sent to students, residents of Massachusetts, taking agricultural courses at State agricultural colleges in the other New England States, to find out the reasons for their entering other colleges instead of the college in Massachusetts.

An examination was made of the catalogues of the leading agricultural colleges in the United States and Canada.

Numerous communications were received from those who were unable to attend public conferences, and a large amount of oral testimony, as well as written communications, was thus obtained from educators and officials in other colleges, and from farmers and representatives of various classes. The members of the Commission have given their services gratuitously, and have only been paid for their necessary expenses.

Expended to Jan. 16, 1918.

Expenses,	\$1,062 40
Clerical work,	2,252 65
Printing, ...	9 20
Total, ...	\$3,324 25

The scope and results of their investigation the Commission would present in the following order: —

I. A brief summary of the Federal and State legislation by which the college has been established.

II. The organization of the college, its trustees, students, graduates and equipment; the graduate school; the experiment station; the extension service.

III. Recommendations and criticisms.

I. LEGISLATION.

The Massachusetts Agricultural College is one of the land-grant colleges established by the Morrill Act of 1862, which granted public lands to the various States and territories, the proceeds of which were to be used to establish colleges of agriculture and mechanic arts.

Section 4 of the Morrill Act is as follows:—

And be it further enacted, That all moneys derived from the sale of the lands aforesaid by the States to which the lands are apportioned, and from the sales of land scrip herein before provided for, shall be invested in stocks of the United States or of the States, or some other safe stocks, yielding not less than five per centum upon the par value of said stocks; and that the moneys so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except so far as may be provided in section five of this act), and the interest of which shall be inviolably appropriated by each State which may take and claim the benefit of this Act, to the endowment, support and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.

The State accepted the offer of Congress by the following act of the Legislature in 1863, chapter 166:—

SECTION 1. The Commonwealth of Massachusetts hereby accepts the grant offered to it by the United States, as set forth and defined in the Act of Congress, entitled: "An Act donating public lands, etc. . . . and the governor of the Commonwealth is hereby authorized and instructed to give due notice thereof to the government of the United States."

In 1863 the college was chartered, according to chapter 220, Acts of 1863, and fourteen trustees were incorporated as a self-perpetuating board.

Two-thirds of the annual interest and income provided by the Morrill Act were given to the Massachusetts Agricultural College, according to section 8 of that act. The remaining one-third of the annual interest and income provided by the act was given to the Massachusetts Institute of Technology, with the understanding that it would give the required instruction in the mechanic arts. (Acts of 1863, chapter 186, section 1.)

The town of Amherst voted to appropriate \$50,000 to the college if it were located there. After litigation favorable to the State, Amherst was chosen as the site of the college.

In 1882, the Legislature passed an act (chapter 212) establishing an agricultural experiment station.

By the act passed in 1884 (chapter 50) the trustees ceased to be a self-perpetuating body, the power of appointment and removal being transferred to the Governor and Council.

In 1887 the Federal government passed the Hatch Act, the purpose of which was "to establish agricultural experiment stations in connection with the colleges established in the several states under the provisions of an act approved July 2, 1862, and of the acts supplementary thereto." This act appropriated \$15,000 annually, for the support of each station.

The Legislature of 1887, chapter 212, accepted the appropriation upon the terms and conditions set forth by Congress in the Hatch Act.

In 1894, by special act of the Legislature (chapter 143), the State experiment station was combined with the Federal station, and afterwards the two were placed under the administration of the trustees of the college.

In 1890 the second Morrill Act was passed by Congress, of which the following is an extract from section 1 of that act:—

There shall be, and hereby is, annually appropriated . . . twenty-five thousand dollars, to be applied only to instruction in agriculture, in mechanic arts, the English language and the various branches of mathematical, physical, natural and economic science, with special reference to their applications in the industries of life and to the facilities for such instruction.

In 1906 the Federal government passed another act, called the Adams Act, which appropriated \$15,000 more each year for the use of agricultural experiment stations.

In 1906 an act (chapter 507) was passed by the Legislature establishing a normal department at the college, appropriating a sum not exceeding \$5,000 for that purpose.

In 1907 the Federal government passed the Nelson amendment, making an additional appropriation that would bring the amount granted to State agricultural colleges by the Morrill Act and Nelson amendment up to \$50,000. Of this amount the Massachusetts Agricultural College receives two-thirds, the Massachusetts Institute of Technology being given one-third.

In 1914 the Federal government passed an act, called the Smith-Lever Act, section 2 of which makes appropriations annually to agricultural colleges in each State for extension work in teaching agriculture.

II. ORGANIZATION.

As a result of the foregoing legislative enactments, the organization of the college at present comprises three main divisions, as follows:—

1. The college, including the undergraduate and the graduate schools.
2. The experiment station.
3. The extension service.

Trustees.—All of these divisions are under the control of one body of trustees consisting of fourteen members who are appointed by the Governor for a period of seven years, two each year, and of four *ex-officio* members,—the Governor of the Commonwealth, the president of the college, the Commissioner of Education and the secretary of the Board of Agriculture.

The duties of the trustees are thus defined (Acts of 1863, chapter 220):—

SECTION 2. The said corporation shall have full power and authority to determine at what times and places their meetings shall be holden, and the manner of notifying the trustees to convene at such meetings; and also, from time to time, to elect a president of said college, and such

professors, tutors, instructors and other officers of said college, as they shall judge most for the interest thereof, and to determine the duties, salaries, emoluments, responsibilities and tenures of their several offices. And the said corporation are further empowered to purchase or erect, and keep in repair, such houses and other buildings as they shall judge necessary for the said college; and also to make and ordain, as occasion may require, reasonable rules, orders, and by-laws, not repugnant to the constitution and laws of this Commonwealth, with reasonable penalties, for the good government of the said college, and for the regulation of their own body, and also to determine and regulate the course of instruction in said college, and to confer such appropriate degrees as they may determine and prescribe; *provided, nevertheless*, that no corporate business shall be transacted at any meeting unless one-half, at least, of the trustees are present.

1. THE COLLEGE FACULTY.

Composition. — The faculty is composed of the administrative officers, all teachers, members of the extension service staff, and members of the experiment station staff of the rank of instructor and above.

Voting Members. — The voting members of the faculty are the teachers of the rank of assistant professor and higher.

Committees. — The faculty is organized into twelve committees whose function it is to initiate policies or to administer certain faculty rules.

Administrative Officers.

The administrative officers are the president, dean, treasurer, registrar, secretary, director of the graduate school, director of the experiment station and director of the extension service.

Five officers are designated as the heads of divisions, as follows: division of agriculture; division of horticulture; division of science; division of humanities; division of rural social science.

Three officers of the institution are in charge of departments not included in divisions above named: the librarian, head of department of military science, and head of department of physical education.

In 1867, the year the college opened, there were four regular teachers in the faculty. In 1916-17 there were 71 teachers who devoted their entire time to teaching, classified as follows: 27 professors, 10 associate professors, 14 assistant professors, 15 instructors and 5 assistants.

There were also 15 half-time teaching assistants and 7 half-time research assistants. Other employees were 51 clerks, 20 skilled laborers, on an average, and 50 unskilled laborers.

Divisions and Departments, — Students and Teachers.

The divisions and departments of instruction, with the number of students and teachers in each in 1915-16, are as follows: —

	Number of Students enrolled.	Number of Teachers.
Division of agriculture, ...		14
Department of: —		
Agronomy, ...	379	3
Animal husbandry, ...	190	2
Dairying, ...	200	4
Farm management, ...	59	2
Poultry husbandry, ...	56	2
Rural engineering, ...	43	1
Division of horticulture, ...		8
Department of: —		
General horticulture, ...	171	1
Floriculture, ...	60	1
Forestry, ...	8	1
Landscape gardening, ...	64	2
Market gardening, ...	17	1
Pomology, ...	127	2
Division of science, ...		27
Department of: —		
Botany, ...	231	4
Chemistry, ...	755	5
Entomology, ...	157	4
Mathematics, ...	330	4
Microbiology, ...	74	3
Physics, ...	344	3
Veterinary science, ...	39	2
Zoölogy and geology, ...	233	2
Division of the humanities, ...		12
Department of: —		
Economics and sociology, ...	109	1
History and government, ...	5	1 ¹
Language and literature, ...	1,036	10
Section of: —		
German, ...	186	2
Music, ²	8	—
French, ...	170	2
Spanish, ³	22	—
Rural journalism, ...	24	1
English, ...	626	5
Total, ...	1,036	10
Division of rural social science, ...		4
Department of: —		
Agricultural economics, ...	96	2
Agricultural education, ...	78	1
Rural sociology, ...	45	1
Miscellaneous departments, ...		3
Department of: —		
Military science, ...	471	1
Physical education, ...	216	2

¹ Part time.

² Music taught by one of the German teachers.

³ Spanish taught by one of the French teachers.

Duties of Teachers.

The heads of all the departments listed on the foregoing statement have administrative duties in connection with the management of their respective departments. The amount of time thus required varies with the different departments. Thus, in the divisions of agriculture and horticulture, a much larger amount of time is required because of the fact that in addition to the usual departmental management the respective heads must direct the outside work of their departments, such as the farm, orchards, dairy, etc.

In the division of agriculture 8 teachers devote an average of 12 per cent of their time to extension service, and 3 members devote an average of 17 per cent to research work.

In the division of horticulture 6 teachers devote an average of 18 per cent of their time to extension service, and 3 members devote an average of 9 per cent to research work.

In the division of science 5 teachers devote an average of 8 per cent of their time to extension service, and 17 members devote an average of 23 per cent to research work.

In the division of the humanities practically no work is done other than that of teaching by members of the school.

In the division of rural social science 3 teachers devote an average of their time to the extent of 13 per cent to extension service, and 2 members devote an average of 21 per cent to research work.

In addition to the number of regular students taught in each department, as shown on the foregoing statement, the staff conducts also the winter school of agriculture, which in 1916 had an enrolment of 153. It also contributes largely to their lectures, demonstrations, etc., to the annual farmers' week, and various conferences which are held on the campus.

The Students.

In the year the college opened, 1867-68, 56 students were in attendance. The first class graduated in 1871, with 27 members.

The number of students enrolled in the college in 1916-17 was 680, including 57 graduate and 37 unclassified students.

The attendance has increased sixfold since 1898, and has trebled in the last ten years.

The following is a summary by classes for the year 1916-17:—

Graduate students, ...	57
Senior class, ...	104
Junior class, ...	138
Sophomore class, ...	174
Freshman class, ...	170
Unclassified students, ...	37
Total registration, ...	680

One hundred and one students graduated in 1916, and 104 in 1917.

In 1916-17 there were 680 students in the Massachusetts Agricultural College, and 629 college-grade students in agriculture in all the other New England agricultural colleges.

Women.

In 1899 women students were first enrolled at the college to take the regular courses.

Twenty-eight women attended the college in 1916-17.

Tuition.

The students pay no tuition, except those from out the State, who pay \$60 per year.

Tuition to persons who are not citizens of the United States is \$120 per year.

Cost of Instruction per Capita.

As nearly as can be estimated, the cost to the Massachusetts Agricultural College per student per year for instruction is \$203; maintenance, \$133; administration, \$42; total, \$378.

Requirements for Admission.

The requirements for admission to the college are based on the completion of a four-year high school course or its equivalent, and are stated in terms of units. The term "unit" means the equivalent of at least four recitations a week for the school

year. Fourteen units must be offered for admission, of which eight and one-half units are prescribed, and five and one-half elective.

The standard of admission is in most respects the same as that of the other agricultural colleges, and also of the other colleges in the Commonwealth.

No classical languages are required either for entrance or graduation. French, German and Spanish are the only foreign languages taught in the college, and these are elective, except that one course for a year in French or German is required.

Courses of Study.

The college has 345 one-term courses of instruction, including those in military training which, under the terms of the Morrill Act, are required of all students.

The course of study is designed to give both a liberal and agricultural education, and an opportunity to specialize in any department in which a major course is offered.

Seventeen teaching departments offer majors; at the end of the sophomore year all students are required to select one from this list, and during the last two years must devote at least one-half of their time to studies prescribed under this major.

Requirements for graduation are four years of prescribed and elective work.

The standards of the college are designed to be equal to those of other colleges and technical institutions of high grade.

The work of the first year includes only required work, optional work beginning in the second year and continuing through the other years.

The Policy of the College.

The policy of the college is thus stated by the president: —

The permanent function of an agricultural college, supported at public expense, is to help solve the rural problem. The task of the college is as broad as the rural problem itself. This problem consists in the most complete utilization and conservation of the physical, economic, social and spiritual resources of the Commonwealth, for the purpose of attempting to erect an adequate rural civilization, and to secure the fullest possible contribution of the farmer to the common welfare.

The purpose of the Massachusetts Agricultural College, therefore, is to utilize the processes of education in helping to improve the agriculture and country life of the State and nation, and to assist in adjusting the relationships between producers and consumers of products of the soil.

The college is one of many agencies of society, some supported by the State, some voluntary and private, all designed to further rural welfare. Each agency has its peculiar function, and the activities of all must be correlated in order that harmonious development may ensue. The college will participate in the effort to analyze and clarify the rural problem; to study the agricultural resources, conditions and needs of the Commonwealth; to formulate a large, practicable, State-wide plan of rural improvement; and to co-operate in carrying out the plan. The college will also find its place in a comprehensive State system of agricultural education that ministers to the needs of all the people of the State, young and old, in school and out, and will retain a vital touch with all parts of the system.

It becomes, then, a fundamental duty of the college to render all possible assistance in the solution of the various problems of agriculture and farm life in the Commonwealth; to give unstintingly of technical knowledge, intelligent sympathy and real helpfulness to those people of the State who are interested in rural affairs; and to participate in constructive, co-operative efforts dealing with rural development in the local community, in the State and in the nation.

Short Courses.

Short courses were carried on for many years at the college, but definitely organized in 1909, when the Legislature appropriated \$7,500 for that purpose. They are now maintained out of the \$50,000 appropriated by the State for extension service and short courses. The winter and summer schools are established for those who wish to study agriculture but are unable to take a four-year course. No entrance examinations are required, but the candidates for admission must be at least eighteen years old. The winter schools extend over ten weeks, and the summer schools over four. They are conducted by college teachers on the campus, but are under the supervision of the director of the extension service, who also has the title of supervisor of short courses. There are also schools of one week's duration for rural social service, for rural teachers and for rural clergymen, and there are three agricultural camps of a week each where boys and girls can combine sport with study.

The following is a statement of the short courses conducted in 1916, with the attendance in each: —

Winter Schools.

Ten weeks' course,	153
Farmers' week,	980
Beekeepers' school,	10
Polish farmers' day,	220
Apple packing school,	8
County agents' conference,	55
Bankers' conference,	28

Summer Schools.

Summer school of agriculture and country life,	170
School for rural social service,	35
Conference on rural organizations,	38
Poultry convention,	268
Boys' camps,	88
Girls' camps,	27

2,080

Graduates.

Excluding the graduates of 1916, a recent census of the alumni of the college, who are living, found the number to be 1,171. Of this number, 564 were graduated previous to 1906 and 607 since that time; 45 per cent of the former number and 52 per cent of the latter are living in Massachusetts. Of all living graduates 49.8 per cent are residing in Massachusetts; 65.3 per cent of the graduates are engaged in agricultural vocations; 26.9 per cent of the graduates are engaged in non-agricultural vocations, as follows: business, 7; teaching, 5; engineering, 5; medicine, 3; miscellaneous, 6.9; and the occupations of 7.89 per cent of the graduates are unknown.

In these statistics, vocations connected with the agricultural industry include practical agriculture and horticulture, as well as the teaching positions in agricultural colleges, secondary agricultural schools, agricultural departments in high schools, practicing chemists, botanists, entomologists and other scientists working on subjects related to the agricultural industry.

Material Resources.

Land. — The original Federal grant to the college was scrip for 360,000 acres of western land. This scrip was sold by the State of Massachusetts, and the sum realized from it, after deducting \$29,778.40 for the purchase of land for the college site, was \$208,464.65.

Federal and State Grants. — In 1871 the State Legislature, realizing that the income from the funds provided by the Federal land grant was entirely inadequate for the support of the college, appropriated the sum of \$141,535.35 as an additional endowment.

Income from Federal and State Endowments. — The income from the Federal and State endowments from 1867 to 1905 fluctuated from approximately \$5,000 to nearly \$16,000 a year, the average being about \$11,000. Since 1906 the annual income from these two endowments has been \$10,613.32.

State Appropriations. — From 1864 to 1882 the State appropriated a total of \$259,500 for new buildings and maintenance of the college.

In 1882 the State appropriated \$5,000 annually for research work; two years later this sum was increased to \$10,000 per year. This appropriation was subsequently merged with other funds granted for the current expenses of the college.

In 1883 the Legislature made the first continuing appropriation for instruction at the college. This appropriation was \$10,000 a year, to continue four years. At the expiration of this four-year term the appropriation was made indefinite, and in 1889 an additional annual appropriation of \$10,000 for instruction and maintenance was granted. In 1899 the appropriation was increased by \$1,000. In 1901 the appropriation was increased to \$39,000 a year, including \$10,000 for research work. Since 1907 yearly additions were made to this amount until 1913, when the Legislature provided a five-year appropriation for maintenance, beginning with \$250,000 and increasing to \$362,000 in 1918.

When, in 1913, the Legislature passed the law providing for the annual expenses of the college, the amounts to be spent for the different departments, such as extension, research, instruc-

tion, etc., were not specified. Accordingly, the trustees have made their own apportionment from year to year. They have generally followed quite closely the schedule recommended in the report of the Commission on Economy and Efficiency, made at the time the five-year law was passed.

From 1883 to 1904, inclusive, the State made several special grants for buildings, land, improvements, etc. The average yearly income for these purposes for this period was approximately \$15,000. From 1905 to 1916, inclusive, an appropriation was made every year for similar purposes, ranging from \$47,400 to \$210,000, the average being \$93,460.

Funds. — From the Federal government the college has received \$1,474,177.52, and the State grants total \$4,451,937, the sum total being \$5,926,214.52.

Private benefactions have been small. The total amount from which any income is available is \$49,100.

In 1917 the total funds received from the Federal government will be about \$100,000; from the State, \$340,000, and from fees, sales, etc., \$120,000, or a total of about \$560,000.

The income may be estimated at about \$578,000 for 1918.

The land of the institution at Amherst comprises 600 acres, and is estimated to be worth \$93,418.58. The location has been admirably chosen for the purpose of the college. It is central, and the surface, diversified with meadow and upland, furnishes unusual opportunities for agriculture and agricultural experiments.

The present inventory value of all land, including Mount Toby and two or three small parcels recently acquired, is \$135,000. There are 329 acres leased to furnish additional land for pasture and agricultural demonstrations.

Forestry Reservation.

The college has recently acquired 755 acres on Mount Toby, at a cost of \$30,000, for the use of the forestry department.

Market-garden Field Station.

In 1916 the Legislature was petitioned by certain market gardeners to establish a market-garden field station under the control of the trustees of the Massachusetts Agricultural Col-

lege, and to appropriate \$20,000 for the acquisition of land, the construction of buildings, and for the suitable equipment of the station, and also to provide an annual maintenance fund of \$10,000. There was granted in 1916, \$8,000 to cover all of the above-mentioned purposes. The appropriation was expended as follows: —

12 acres of land in Lexington,	\$4,855 00
Labor,	2,077 93
Equipment and supplies,	1,035 59
	\$7,968 52

This left an unexpended balance of \$31.48.

The Legislature of 1917 was requested to appropriate \$25,000 for the erection of buildings at the field station, and \$10,000 to maintain the station until Dec. 1, 1918. The Legislature granted \$3,500 for a barn, \$1,500 for equipment and \$5,000 for maintenance.

Buildings.

When the college was opened four buildings had been erected. There are now 52 buildings, of which 21 are of brick and stone, and 31 of wood. They have cost \$1,043,485, and are estimated to be worth \$1,008,031.

Equipment.

The equipment of the college, including library books, sewer and water mains, boilers, etc., is estimated to be worth \$425,732.45.

The machinery and equipment of the producing departments mentioned below (live stock not included) are valued as follows: —

Dairy (manufacturing plant),	\$11,017 94
Farm,	5,447 06
Poultry husbandry,	1,249 70
Floriculture,	226 60
General horticulture,	2,087 17
Market gardening,	742 20
Pomology,	696 85
	\$21,467 52

The College Farm.

There are 250 acres under the general supervision of the department of farm administration. The farm furnishes an opportunity to demonstrate the best methods of farm management, machinery, etc.

The live stock of the college farm is valued at \$23,138.

The following is a statement of disbursements and receipts of the college farm for the fiscal year ending Nov. 30, 1916: —

Disbursements.

Cattle, ...	\$12,453 42	
Dairy, ...	4,810 36	
Horses, ...	4,369 31	
Sheep, ...	405 82	
Swine, ...	2,124 30	
Field crops, ...	5,408 74	
Miscellaneous, ...	4,007 60	
Tools and machinery, ...	393 64	
Live stock, ...	1,170 37	
Supplies, ...		\$35,143 56

Receipts.

Cattle, ...	\$1,909 03	
Dairy, ...	21,207 85	
Horses, ...	854 34	
Sheep, ...	210 50	
Swine, ...	1,858 85	
Field crops, ...	1,592 04	
Miscellaneous, ...	1,354 32	
		28,986 93
Deficit, ...		\$6,156 63

Certified Milk.

The college was receiving in 1916-17, $9\frac{1}{2}$ cents per quart for quarts, and 10 cents per quart for pints, for certified milk. If the milk should be produced without observing all the requirements necessary to have the milk certified, and should be sold to the dining hall at 6 cents per quart, there would be a

loss of approximately \$7,100 in income, and not a proportionate reduction in cost of production.

If the cattle were kept only for making certified milk, the account would be as follows for the last fiscal year of the college, 1916-17:—

<i>Receipts.</i>			
Cattle stock, .	\$1,728	50	
Cattle sundries, .	180	53	
			\$1,909 03
Dairy milk sale, .			21,207 85
			\$23,116 88
<i>Expenditures.</i>			
Cattle labor, .	\$5,850	00	
Cattle feed, .	6,203	77	
Cattle supplies, .	399	65	
Cattle bedding, .	850	41	
Cattle inventory shrinkage, .	745	00	
			\$14,048 83
Dairy labor, .	\$2,119	27	
Dairy equipment, . .	114	04	
Dairy supplies, .	2,577	77	
			4,811 08
			18,859 91
Balance credit, ...			\$4,256 97

The Dairy Department.

The dairy department gives instruction in such work as relates to the handling and care of milk, the manufacture of milk into dairy products, — cream, butter, buttermilk, soft cheese and ice cream, — and the construction and equipment of dairy handling and manufacturing buildings.

Inventory of Live Stock on the Farm.

The following is an inventory of live stock of the college farm for the year 1916-17, arranged by breeds: —

Cattle.

BREED.	Pure-bred or Grade.	Class of Stock.	Number.	Value.
Holstein, ...	Pure-bred, ...	Milking cows, ...	14	\$2,285
	Pure-bred, ...	Young stock, ...	13	835
	Pure-bred, ...	Bulls (1 calf), ...	2	400
	Grade, ...	Milking cows, ...	23	1,925
	Grade, ...	Young stock, ...	11	625
	Grade, ...	Steer, ...	1	115
			64	\$6,185
Ayrshire, ...	Pure-bred, ...	Milking cows, ...	14	\$1,670
	Pure-bred, ...	Young stock, ...	19	1,055
	Pure-bred, ...	Young steers, ...	2	40
	Pure-bred, ...	Bulls (5 calves), ...	6	480
	Grade, ...	Milking cows, ...	6	535
	Grade, ...	Steers, ...	2	230
			49	\$4,010
Guernsey, ...	Pure-bred, ...	Milking cows, ...	4	\$700
	Pure-bred, ...	Young stock, ...	8	585
	Pure-bred, ...	Bulls (1 calf), ...	2	550
	Grade, ...	Milking cows, ...	4	345
	Grade, ...	Young stock, ...	7	225
			25	\$2,405
Jersey, ...	Pure-bred, ...	Milking cows, ...	7	850
	Pure-bred, ...	Young stock, ...	4	260
	Pure-bred, ...	Bulls (2 calves), ...	3	85
	Grade, ...	Milking cows, ...	3	220
	Grade, ...	Young stock, ...	2	120
			19	\$1,535
Shorthorn, ...	Grade, ...	Milking cows, ...	1	65
Grand total,			158	\$14,200

Swine.

Berkshires, ...	Pure-bred, ...		10	\$405
Chester Whites, ...	Pure-bred, ...		12	440
Yorkshires, ...	Pure-bred, ...		8	305
Grades and crosses, ...	Grade (fattening hogs), ...	-	53	355
Total, ...			83	\$1,505

Sheep.

Shropshires, ...	Pure-bred, ...	-	20	\$296
Southdowns, ...	Pure-bred, ...	-	16	364
	Grade, ...	-	1	8
Total, ...			37	\$668

Horses.

French Coach, ...	Pure-bred, ...	-	2	\$250
Percheron, ...	Pure-bred, ...	-	9	4,500
	Grade, ...	-	12	2,015
Total, ...			23	\$6,765

The Graduate School.

The graduate school is not the result of any special legislative enactment or appropriation of State funds. Graduate courses were offered as far back as 1875, and probably previous to that time. The school grew out of the desire expressed by graduates of the college to pursue special courses after graduation, and was formally organized in 1912 and was empowered to confer degrees.

The graduate staff is composed of 21 members connected with teaching.

The director of the graduate school is head of the graduate school faculty, and, in general, is responsible for the character of its work and has the oversight of graduate students.

Associated with him in directing the school there are 14 professors, 3 associate professors, 1 assistant professor, 1 research pomologist and 1 instructor. These teachers are part of the regular staff of the college, and do not devote their time exclusively to the graduate school.

2. EXPERIMENT STATION.

The experiment station was established by Federal and State legislation in 1887. (See page 8.)

In 1882 the State made its first appropriation of \$5,000 for the maintenance of an agricultural experiment station. In 1884 the annual appropriation was increased to \$10,000, and continued at this figure until 1913, when the Legislature provided a five-year maintenance fund for the entire institution, out of which fund the amount derived from the State for the experiment station in 1915-16 was \$30,000. The station also received from appropriations by the Federal government \$30,000.

The experiment station staff consists of 39 members who are immediately connected with the work of the station.

The director of the experiment station has full administrative responsibility, under the president, for the work of research and investigation. He recommends members of the staff to appointment, presents definite projects of work, prepares the budget for the year, approves all bills, etc.

Nine persons are employed in the clerical work of the station.

The work of the station is mainly in three distinct lines,—control work, investigation and special service.

Control Work.

The director of the experiment station is charged with the enforcement of three control laws to prevent fraud in commercial fertilizers, commercial feedstuffs, and machines and glassware for testing the quality of milk and their fitness to make the Babcock test.

In the year ending Jan. 1, 1917, 800 analyses, representing 552 distinct brands of commercial fertilizers, were made.

In the same year over 1,100 samples of feedstuffs were collected and examined, and over 1,300 brands of feedstuffs were registered and permits for sale issued.

The same year machines and apparatus in 87 milk depots, creameries and milk inspectors' laboratories were examined, and over 5,000 pieces of glassware were tested for accuracy. Thirty-eight candidates were examined and received certificates of fitness to make the Babcock test for butter fat.

Though not required by law, the station undertakes to make official determinations of the yields of pure-bred cows in milk and butter fat in all cases in which the owners desire such tests to be made. The number of cows tested during the past year was over 350. The cost is met by fees paid by the owners.

Investigation.

The chief object of the experiment station is to acquire useful and practical information on agricultural subjects, and to promote scientific investigation and experimentation respecting the principles and applications of agricultural science.

Most of this investigation is conducted on the grounds and in the buildings of the station and college, but summer work is also carried on relative to the cranberry in the sub-station in Wareham, to market-garden problems in Lexington and to asparagus in Concord, while there are experiments in co-operation with farmers in various parts of the State on alfalfa, asparagus and

wheat. In addition, certain lines of investigation are being carried on on land leased for the purpose, the most important among these being the orchard experiments in South Amherst.

Investigations in progress vary widely in character, some being little more than simple comparative tests, others dealing with comparatively narrow and simple problems which can usually be solved within a short time; but a large proportion of the investigations are fundamental in character, and frequently continue over long periods, but have scientific relations and bearings that are of great value in the agriculture of the State and of the country. They are, however, too extensive and varied to be given fully within the limits of this report. A few illustrations of their character must suffice.

The best methods of feeding, the cost of production, and the methods and cost of distribution have been studied and the way pointed to many important improvements.

Fertilizer experiments extending over many years have thrown important light upon the specific value and adaptation of all classes of fertilizer materials, and have indicated the special fertilizer requirements of our principal crops.

Methods of top-dressing, permanent mowings and pastures have been carefully investigated under varying conditions.

Two crops of wide importance — Japanese barnyard millet and medium green soy beans — have been introduced to American agriculture.

The study of the causes of disease in farm, garden, hothouse and floricultural crops has led to discovery of effective methods of prevention, — for example, steam fertilization of seed beds, and, in the case of hothouse crops, better management as regards light, ventilation and watering. Injuries to shade trees, especially from gas and electricity, have been discovered and methods of prevention pointed out.

A large amount of attention has been given, with important results, to the study of insect damages and methods of prevention, especially onion thrips, the greenhouse red spider, the gypsy moth, the oriental moth, the onion maggot, and a large number of insects injurious to the cranberry crop.

The possibilities and disadvantages of attempted sugar production from the beet and sorghum were carefully studied.

The digestibility of practically all prominent cattle feeds has been determined, and their value and adaptation indicated.

The feeding value of different varieties of salt marsh hay, of molasses and a considerable number of new feedstuffs has been determined.

The chemistry and bacteriology of market milk have been studied and methods of improvement in production and handling suggested.

The chemistry of insecticides has been studied and important improvements in manufacture indicated.

The specific chemical effects of different fertilizer materials on soils, and the relations of these changes to productive capacity, have engaged attention.

Plant-breeding work in co-operation with the Federal Department of Agriculture has resulted in the production of a highly improved rust-resistant strain of asparagus, and other plant-breeding work of scientific importance has been carried on.

A large number of tests has been made to determine the relative value of varieties of farm products and fruits.

Orchard experiments have led to important improvements in management as regards especially the use of fertilizers, pruning and spraying.

Considerable progress has been made in the production by scientific breeding of a non-broody strain of one of the American breeds of poultry, while numerous experiments in the management and feeding of poultry have contributed largely to a knowledge of the best methods.

Diseases affecting our different domestic animals have been investigated, and better methods of management discovered.

Special Services.

The station carries on an extensive correspondence in answer to inquiries, giving advice on a wide range of subjects; making free analyses; examination of seeds; determining causes of injury from diseases or insects; advising as to identification of fruits and grasses; blood tests of laying hens and making sanitary water analyses. Over 15,000 letters are now written annually in answer to such inquiries.

Publications.

Annual reports and special bulletins are published every year by the station giving the results of its investigations and much information upon agricultural subjects and meteorological observations. For instance, over 100 topics were studied on the subject of animal nutrition and dairying, and the results published and distributed to the farmers of the State.

3. EXTENSION SERVICE.

The object of the extension work is to give to rural communities outside of the schools instruction in improved methods of agriculture. That object is clearly stated in the Smith-Lever Act of 1914,¹ which granted Federal aid for the prosecution of this work in connection with the Agricultural College, and the colleges in each State receiving the benefits of the land grants.

The extension service has received from the State approximately as follows:—

In 1908,	\$5,000 ²
In 1909,	7,500 ²
In 1910, . . .	15,000 ²
In 1911, . . .	20,000 ³
In 1912,	50,000
In 1913, . . .	50,000
In 1914,	50,000
In 1915,	50,000
In 1916,	50,000
Total, ...	\$297,500

This work was extended by the Federal legislation of 1914, providing for co-operative extension work in agriculture and home economics.

The Federal appropriation to the college under the Smith-Lever Act is \$16,000 for 1917. This amount will be increased until 1923 by about \$2,400 annually.

¹ See page 9.

² For short courses in agriculture, etc.

³ For short courses and extension service.

The college is also receiving from the Federal government \$20,000 this year for farmers' co-operative demonstration work. This should not be regarded as a continuing grant. The grant is made each year for specific projects, and there is no assurance that any such project will be continued for more than one year. Thus, whereas the college is now receiving \$20,000 in a special grant, in four or five years this amount may be withdrawn; on the other hand, it may be increased somewhat. If the Federal and State governments continue the extension work appropriations on the present basis, there will be available, in 1917, \$84,000, and with the increases provided for, the college should have in six years an annual fund of \$100,000. It conducts many projects with the use of State funds alone, or in co-operation with the United States Department of Agriculture.

There are 25 members on the staff of the extension service, 16 of whom devote their entire time to it.

The director of the extension service has general supervision of the outside work of the institution.

There is a committee of the Board of Trustees of the college, called a committee on extension service, before which are placed all plans, budgets, apportionments, etc., for approval at the beginning of the fiscal year, and at such intervals as is necessary throughout the year.

Nine persons are employed in the clerical work of the service.

All work is laid out in the form of written projects. Finances for each project are apportioned at the beginning of the year. These projects receive the approval of the head of the department concerned, the director of the extension service, the president of the college, the United States Department of Agriculture officials in case Smith-Lever or United States Department of Agricultural Co-operative Demonstration funds are used, and finally that of the trustees' committee, before they are put in operation.

The projects conducted by the extension service during 1916-17 were as follows: —

Pomology.

Correspondence courses.

Civic improvement.

M. A. C. Improvement Association.

Community planning.
 Library extension.
 Lectures.
 Exhibits.
 Printing and publications.
 Animal husbandry.
 Junior extension.
 Farm management demonstrations.
 Poultry husbandry.
 Home economics.
 Dairying.
 Extension schools.
 County and local agents.
 Co-operative organization and marketing.
 Miscellaneous helps.

Farm Bureaus.

Important agencies co-operating with the extension work are represented by the county leagues and farm bureaus. They are organized in every county except Suffolk.

Farm bureaus may organize in Massachusetts under an act of the Legislature of 1914 (chapter 707).

They form a corporation under the State laws, but must then apply to the Massachusetts Agricultural College for approval of their organization, after which they may ask support for their work from the county commissioners.

The actual direction of the work of the agents is vested in an advisory board of seven, three appointed by the farm bureau corporation, three by the county commissioners and one elected at large.

The college and the United States Department of Agriculture employ co-operatively a county agent leader. It is his business to familiarize himself with the best in county agent work in this country; to keep in touch with the Federal department; to help county agents in organizing their work; to co-ordinate the work of the several counties so that it will form a general State plan; and to bring the extension specialists of the college and the county agents into close contact, thereby assisting them to carry on their work in a more effective manner.

All the work of these agents is planned in advance, and put in the form of written projects, which are approved by the local

board and the county agent leader before being put into force.

Monthly reports from each county are sent to the county agent leader, who summarizes these and makes his report to the United States Department of Agriculture, and its suggestions are passed on from county to county.

The college and the United States Department of Agriculture contribute jointly the sum of \$1,200 toward the salary of an agent in each county, and \$300 additional where a home demonstration agent is employed.

The remainder of the financial support is secured from the county appropriation, from interested individuals, and through appropriations made by towns in their annual town meetings.

An annual conference, lasting one week, is held at Amherst. All county agents are expected to attend this conference. Here plans and methods are discussed by the Federal and State representatives and by the men themselves.

Lectures and lecture courses are arranged through county agents, and exhibits in connection with agricultural fairs are arranged so that they may be used at fruit, dairy, poultry shows or other exhibitions.

Farm management demonstrations are also given in order to enable the farmers to reorganize their farm management and place the same on a proper basis.

Several directors of the farm bureau are selected in each town to help organize the work and to assist the agent in carrying out his projects.

Under the so-called anti-aid amendment to the Constitution a new farm bureau law will be necessary if these are to be supported by public funds.

The Junior Extension Service.

The junior extension work, so called, is that project of the extension service which organizes and supervises the boys' and girls' clubs of the State that are interested in agriculture and home economics. The boys' and girls' club work has been organized several years, and was introduced into Massachusetts by the college in the spring of 1908. It has gradually grown into a membership of 93,000 in 1917. They are organized in 300 towns, with 350 teachers acting as assistants. They are

engaged in market gardening, raising potatoes and corn, canning, bread making, poultry husbandry, dairying, pig clubs, in this kind of service. They receive \$2,000 in prize money from the State Board of Agriculture. Private persons have also contributed to the work. The work has developed among the boys and girls in many instances a desire for advanced agricultural education, and has thereby increased the membership of the State college.

The college holds also relations to the following State organizations: —

State Board of Agriculture. — It has supervision of 32 agricultural fairs to which it pays bounties. It held, during the past year, about 160 farmers' institutes. It publishes an annual report, bulletins, nature leaflets and reports of other phases of its work, gives advice to inquirers at office on agricultural matters, and maintains a distributing library of 6,000 volumes. The work of the Dairy Bureau of the State Board of Agriculture consists in police work relative to the enforcement of dairy laws, and educational work for the purpose of improving dairy products. The Board also is responsible for nursery and apiary inspection, enforcement of apple-grading law, employs an ornithologist, and encourages agriculture directly by special exhibits, demonstrations and the distribution of bounties to incorporated poultry associations.

State Forester. — The forest service of the State carries on an elaborate forest-fire protection, develops reforestation, and has charge of the suppression of the gypsy and brown-tail moths. It promotes the perpetuation, the extension and the proper management of the forest lands of the Commonwealth, both public and private. On request it gives owners of forest land aid and advice in the management thereof. The white pine blister rust has interested both the State Board of Agriculture and the State Forester.

Department of Animal Industry. — This department enforces laws relative to contagious diseases of domestic animals, and has the power to secure proper hygienic conditions for such animals; it also has supervision over the importation of live stock into Massachusetts from other States and countries.

State Board of Education. — This Board is carrying on a comprehensive campaign on behalf of a thoroughgoing system of agricultural education of high school grade, and under the provisions of the Vocational Education Act, it has supervision of all State-aided agricultural schools and departments of agriculture in schools of secondary grade.

III. RECOMMENDATIONS AND CRITICISMS.

THE TRUSTEES.

No change is recommended in the method of appointment of the trustees. On the wisdom exercised in the selection of this important body the welfare of the college primarily and continuously depends, for to them, subject only to the superior authority of the Legislature, the entire control and management of the college is intrusted. In some States trustees are elected by popular vote; in other States, in part by the graduates and by the appointment of other State officials. Happily political considerations have not apparently influenced the appointment of trustees in the Massachusetts college.

One of the questions before the trustees of the college during the past few years is whether the college is or is not a State institution. Practically there can be, of course, no question in the matter, but it seems the fact that the trustees form a corporation has raised some technical legal questions as to whether the institution is in all respects a State institution. In order that this technical question may be settled, the trustees should secure legislative action upon it.

THE FACULTY.

No change is recommended in the method of appointment of the faculty of instruction. While inferior in authority to the trustees, on their intelligence and character depend chiefly the reputation and success of the college, and it is most desirable that men of the highest ability should be chosen for such positions and should be paid adequate compensation for the service they render.

There is no evidence that members of the faculty are engaged in outside activities detrimental to their work. In some instances they have been employed for specific work by State bureaus and some other organizations, but their work has been done mainly during vacation, and has not been prejudicial to the interests of the college.

The Commission has been asked to inquire whether practical farm experience is required as a prerequisite for employment

as instructor or professor. The fact is, a great majority of the instructors in the departments of agriculture and horticulture have had practical farm experience. The trustees have no rule which requires this. The Commission finds no reason why such a rule should be enacted. In many instances it would seriously handicap the trustees in filling certain positions if such a requirement were made. It is obvious that in many teaching positions practical farm experience will enhance the value of the services of the instructor, and may, at times, even be regarded as an essential element.

The trustees, it appears, have recognized the advantage of such training, and have taken it into account in their appointments.

RETIREMENT AGE AND ALLOWANCES.

It seems desirable that the term of service of the officials and faculty of the college should be limited by age. While no age limitation to personal power can ever be accurately fixed, experience has shown that for most men the intellectual ability diminishes at about three score and ten, and in many colleges it is now the rule that teachers should be retired at the age of sixty-eight or seventy years. Few teachers have had salaries sufficient to lay up money enough to support them in old age, and the trustees may sometimes be constrained by humane motives to retain teachers after they have passed the period of greatest usefulness. It is recommended, therefore, that all teachers or scientists of the staff be retired at the age of sixty-eight and that persons so retired who have been in the service of the college at least fifteen years should be granted retiring allowances, either by the trustees or by the Teachers' Retirement Board after suitable legislation.

ENTRANCE REQUIREMENTS.

No other detail of administration is more important than that which deals with the selection of students. The aim of this selection should clearly be to secure those students who are likely to benefit by the courses in an agricultural college, and to turn to the advantage of themselves and of the community the instruction they will receive in such an institution.

The standards of entrance should be high enough to secure students capable of maintaining a high grade, both of academic and scientific study. Without admitting that these entrance requirements should be the same as those adopted by the colleges of liberal arts, yet the Commission believes that they should be of as high a standard.

The whole question of the requirements to be fixed for entrance to college has been long under discussion. It seems clear that all colleges must study the question, both in relation to their own requirements and in relation to the general responsibilities placed upon secondary schools. These schools are not chiefly college preparatory institutions. Other demands far outweigh in importance the incident of college preparation. Doubtless the colleges will increasingly recognize that the desideratum they seek is that of a body of students properly developed in their mental capacity, and that they will be readier than they have formerly been to recognize that the intellectual faculties can be well trained through a much wider range of school subjects than those to be found in the traditional college preparatory courses.

The Massachusetts Agricultural College has taken as the basis for its requirements for admission the fourteen units adopted by most of the New England colleges, as formulated by the National Conference Committee on standards of colleges and secondary schools.¹ Eight and one-half of these units must be taken as specified in English, mathematics, history and one modern language, and for these no substitute is allowed. The remaining five and one-half units may be chosen from twenty-three electives, in which are included all those specified by the College Entrance Certificate Board, and some others that are taught in most secondary schools. These additional units represent a free margin of choice, which makes, under present conditions of college entrance, a reasonable concession to the conditions under which students may have pursued their high school courses. There is certainly no justification for the statement sometimes made that classical requirements are imposed upon those who would seek entrance to the Agricultural College. It should be noted that no student is required to have taken

¹ See page 13 for definition of unit.

courses in Latin or Greek in order to gain entrance, and, singularly enough, and with no good reason apparently for the discrimination, students who are prepared for the classical colleges are not given as much credit for their Latin in the Massachusetts college as they receive at the colleges for the liberal arts.

The Commission indorses fully the position of the college in requiring that its students shall be as well prepared for its instruction as students are for advanced instruction in any other institution of higher education, and that the degrees it confers shall be of equal worth in their field with the academic degrees conferred by other colleges as certificates of attainment in other fields.

It has been claimed that the entrance requirements of the Massachusetts Agricultural College have forced students to go to the agricultural colleges of other States to secure an agricultural education. An examination of the catalogues of New England States shows that 95 students from Massachusetts were in neighboring State colleges in the year 1916-17, and that 85 students from these States entered the Massachusetts State College in the same year. While a questionnaire addressed to these students calls forth the statement of a variety of reasons for the selection of an out-of-the-State college, this Commission is unable to see anything in most of these figures save an ordinary and normal interchange of students from one State to another.

Certain facts have indicated that the requirements at the Massachusetts College may have been in some cases administered with too great severity and too little consideration of individual ability, so that a few have been excluded who were qualified to take the college course. While this is to be regretted and should not be condoned, there is conclusive testimony that the college, by the maintenance of reasonably high standards, has gained in the number and intellectual quality of its students.

In no agricultural college at present is any entrance requirement in agriculture prescribed, partly because opportunities to pursue such courses are rarely available. An arrangement was made, however, in 1915, in the Massachusetts college, to accept three credits in agriculture from high schools whose

agricultural courses have been approved. To provide for co-operation with the States in the promotion of agricultural education the Smith-Hughes Act was enacted by Congress last winter, whereby progressive Federal appropriations have been made, to be distributed among the several States, beginning with \$500,000 in 1916 and steadily increasing until 1926, when the appropriation will amount to \$3,000,000, and afterward that sum will be distributed annually until the law is repealed. One of the conditions of the act is that the education in the schools which the appropriation assists "shall be of less than college grade, and shall be designed to meet the needs of persons over fourteen years of age who are preparing for a trade or industrial pursuit, or who have entered upon the work of a trade or industrial pursuit."

The operation of this act will probably tend to promote the study of agriculture in secondary schools, as a certain portion of the funds will be expended for agricultural instruction.

Bearing upon the entrance requirements the Commission would make three specific suggestions.

First. — That the college should administer its technical requirements so that they will not be arbitrarily taken as the final and sole criteria for the selection of students. In so far as students applying for admission come from the high schools of Massachusetts, it ought to be possible to get from high school principals and teachers sufficient information to determine the fitness of applicants for college work.

The college has recently adopted the policy of admitting on probation those students who, though unable to meet exactly the technical requirements of admission, yet present other evidence of their ability to carry on profitably the work of the institution. This step has the approval of the Commission.

Second. — With the establishment of county schools of agriculture and of agricultural departments in high schools comes the question of the values which should be attached to secondary school courses in agriculture as preparatory to the agricultural college.

It is certain that these courses, both in county schools and in high schools, must have different aims than that of college preparation. Relatively few of the students following them

will go to college. To make prominent in such schools or courses preparation for college would defeat the main purpose for which they are established. However, it is inevitable that these secondary school courses will serve to disclose to many youth their aptitude and opportunity for more extended agricultural study.

The boys' and girls' agricultural clubs, reaching youth of elementary school age, have in the testimony of the college authorities led some to college. The agricultural college as the last stage in a State-wide educational system for the advancement of agricultural science should be closely correlated with secondary schools where agriculture is taught. The Commission approves and recommends the institution of optional agricultural courses as far as practicable in municipal high schools, and the granting by the college of the same credits as would be given in any other science to students who have attained satisfactory standing in such courses. At the same time, the other courses which are properly included in high school studies should not be eliminated, but should be so arranged as to make it possible for the student to secure a thorough and comprehensive training which will enable him to enter the agricultural college in good standing, and with at least an elementary knowledge of the subject on which his future work will naturally be based.

Third. — The Commission believes it would be derelict in its duty if it did not point out a chaotic condition which now obtains with reference to educational standards in this State, and which must obtain until such time as the Legislature provides some agency of standardization. At present there is the greatest diversity in the administration of all departments of public educational activity. Each town having its own separate and distinct school system presents characteristics which, in some instances, vary from those of adjoining towns. There is no uniformity, even on the broadest principles. The number of years required in the different towns and cities for the accomplishment of the school course is not the same. Courses of study, even in essential particulars, are unlike, and in practically every case of school administration there is a lack of proper co-ordination. So marked is this situation that pupils

removing from one town to another lose class standing, are retarded in their work, and are measured according to greatly varying standards. This condition, while it affects chiefly school progress within the elementary and secondary schools, is not without its effect in the determination of college entrance conditions.

While it is desirable to preserve the integrity of local control in matters of detail, it is entirely possible to devise a system which, within certain broad lines, will so co-ordinate the public schools that pupils will be protected from the results of an extreme individualism.

The Commission would, therefore, recommend that the State Board of Education be empowered to formulate and enforce to some extent standards for the elementary and secondary schools for the entire State.

COURSES OF INSTRUCTION.

The courses of instruction in the college should indicate an institution of a high grade, for the teaching of scientific agriculture. In its distinctive field of agriculture it should be comparable with the Massachusetts Institute of Technology in its field of the mechanic arts. No countenance whatever should be given to any suggestion that the agricultural college be placed on the level of a trade or vocational school.

The land-grant colleges were primarily established to promote the study of agriculture by the most advanced and scientific methods of instruction. In their courses of study one naturally expects that science will occupy the most prominent place, and that it should be taught by men well qualified for their work. The Massachusetts Agricultural College meets this expectation.

There are at present 228 courses in agriculture and the cognate sciences, and only 96 courses in mathematics and the so-called humanities. In the first year 48 courses are given in agriculture and mathematics, and only 18 in the humanities. In the second year 6 courses are required in the humanities, and 54 in agriculture and cognate sciences. After the second year a major course can be elected in one of 17 departments; during the last year 75 per cent of the students elected major

courses in agriculture and horticulture. There is no major course in the humanities, and only one-quarter of the students' time is required in these studies. Three-quarters of the students are giving three-fourths of their time to distinctively agricultural subjects. Ten times as many courses are given in junior and senior years in agriculture as were given ten years ago, and more agricultural studies have been introduced in the first and second years than ever before.

There has been no corresponding increase in humanistic studies. Of the faculty 54 teachers are engaged in instruction in agriculture and the cognate sciences, and 14 teachers in the humanities and mathematics. Members of the faculty and representative students alike testify that there is a prevailing tendency among the undergraduates to elect studies according to their supposed commercial values and to neglect those studies which aim to strengthen and cultivate the mind. While there is a fair showing of humanistic electives in the curriculum, most of them are not required as they are in the Massachusetts Institute of Technology and in other colleges, and only a few of the students elect them. Not only is there to be considered the number of courses, but account must be made of the order in which the courses are offered. The Commission recommends that the college authorities consider readjustment of the courses so as to give larger place to practical work in the first two years; also certain courses, — as, for example, that in rural journalism, — might be carefully scrutinized to see whether they are really desirable and essential offerings of the college.

While the State in its acceptance of the provisions of the Morrill Act is bound to give special instruction in agriculture, it is no less bound by the language of the act to give a liberal education as an integral part of its distinctive work, and not to neglect or relegate to subordinate places those studies which experience has shown are best fitted to nourish and strengthen the faculties of the mind and which will enable men to do better work, whatever that work may be.

The college has been severely criticized because no larger proportion of its graduates become practical farmers, owing it is said to the lack of practical instruction which they receive.

An examination of the curriculum shows that this criticism is no longer merited. Practical farm work is now given during the first two years, and is required of every student. Of the total hours assigned to instruction in the division of agriculture and horticulture 32 per cent are given to classroom work, and 68 per cent to laboratory and field work. The field work should be considered as indispensable as is laboratory work in any science, so that students may apply practically the instruction which they receive theoretically. A summer session has also been recently introduced whereby such work can be carried on more readily. The lack of practical farmers, therefore, among the graduates does not appear to be due to a lack of practical work in agricultural instruction, and can be more readily explained from other causes.

Practical farmers the college does educate. They are found in all parts of the State, and are conducting farms which are profitable to themselves, and are profitable as object-lessons.

The important consideration, however, is that the college should train men who, by their superior education and intelligence, can make valuable contributions to the agricultural interests of the Commonwealth.

The college, in comparison with other agricultural colleges, makes a distinctly favorable showing in the proportion of its graduates who have become agricultural teachers and experts in agricultural science.

The college authorities should be fully sustained by the public in maintaining a high standard of instruction and in holding students to a high standard of scholarship.

Complaint also has been made because many students educated in Massachusetts settle in other States, and Massachusetts loses the benefit of their work. It should be remembered, however, that the State college here is largely indebted to the Federal government for its support, and if its graduates enter into the service of other States it is only repaying the Federal government for the aid it has received. All the States are mutually indebted to each other for scientific knowledge, and it should be a source of congratulation rather than of complaint that the Agricultural College here can repay to other States something of its indebtedness to them.

Let it be emphasized, however, that the first and constant care of the Massachusetts College of Agriculture is the promotion of the welfare of agriculture in Massachusetts. It will be judged by the results it produces on that industry in this State.

There should be the closest affiliation between the Federal and State agencies for the advancement of common interests, and every State college should work not only for the interests of its own State, but also for the promotion of agriculture throughout the United States.

THE GRADUATE SCHOOL.

The graduate school properly completes the work of the undergraduate college. There is the same necessity for specialists in agriculture as in other sciences, and the four years of undergraduate work are not sufficient to provide the specialists who are needed, although that work is an excellent preparation for those who desire to specialize in a higher school. The demand for specialists in agriculture is greater than the supply, according to the United States Bureau of Agriculture, and there are many places where well-trained specialists in agriculture can receive large salaries.

The college is in constant need of teachers prepared by advanced instruction to train undergraduates, and the experiment station must also be supplied with men qualified to carry forward research work. Through the foresight of the Legislature the graduate school has now for its headquarters the micro-biological laboratory, admirably equipped for work in that department. It is of fireproof construction and can readily be enlarged when the present quarters are outgrown. The school is attracting more and more men from other States and other countries, who desire advanced instruction in agriculture. The Commission approves the wisdom of the trustees in establishing the school, and recommends ample provisions for its maintenance.

THE EXPERIMENT STATION.

The experiment station is one of the most important departments of the college. Little progress in agricultural science can be made without it. The station has been criticized for not answering soon enough applications for relief from certain pests

which threaten plant life; for duplicating publications of other agencies; for using too frequently technical and scientific nomenclature; for undertaking work with its limited equipment which could be better accomplished by the United States Department of Agriculture; and for laxity in enforcing the penalties for disobedience of the State control laws.

The answer of the station to these criticisms is that some of the defects are due to the lack of enough competent investigators, and to the difficulty of finding, without prolonged research, the remedies desired. The college has already adopted measures this year for an oversight of its own publications so as to prevent their duplication. Some of the publications are, according to the station, intended for scientists who are familiar with scientific phraseology, but most of them can be readily understood by any one of ordinary education.

It would be well for the station to leave to the United States Bureau any investigations which that Bureau could carry on more effectively in consequence of its greater resources.

The studies in which the experiment station has been engaged are often complex and difficult, and need the co-operation of experts in several departments. While the Commission has discovered no laxity in the enforcement of State laws, it seems better to relieve the station entirely from the administration of the control laws, so that the attention of those engaged in the work of the experiment station may be exclusively given to research. In the earlier days of the college the inspection of fertilizers was considered of much greater relative importance, and the attention of the investigators was, therefore, mainly devoted to that work. The routine work is of less value to agricultural progress, and the main work of the station should be carried on by highly trained experts who give practically all their time to research. It will be conceded that research work, especially elaborate technical investigations such as are conducted by the experiment station, can be best accomplished by giving them the exclusive attention of the investigator. If the investigator's attention is diverted or interrupted by other work his progress in his investigations is delayed in even greater proportion than is represented by the amount of time actually lost. Investigators who are also endeavoring to teach are

frequently compelled to give up experimental work almost entirely during term time, because the demands of their classes and interruptions by individual students make consecutive work on investigations absolutely impracticable. Even where a certain amount of work is possible under these conditions, it has been noted that the work done is not so thorough, and the conclusions reached are apt to be superficial. On these points the director of the station and the authorities of the United States Office of Experiment Stations appear to be entirely in accord. In the opinion of the Commission the work of the experiment station would be more efficient if arrangements could be made for all its staff to devote full time, or practically full time, to experimental and investigational work. To a very limited extent the giving of instruction by officers of the station may be advantageous, and it is perhaps detrimental to separate them entirely from contact with the ordinary work of the college; but so far as is feasible arrangements should be made to prevent their attention being diverted and their important work interrupted by other duties.

Notwithstanding these criticisms, the importance of the experiment station is clearly recognized. It has already saved the farmers of the State large sums in the detection of bad, and the discovery of good, fertilizers, in the treatment of plant and animal diseases, in teaching how to get rid of the most destructive pests of plant life, in showing the comparative value of varieties of food, in testing the productive capacity of different soils, and in testing pure-bred cows to determine the quantity and quality of milk. The station has richly contributed to the agricultural wealth of the State.

The station should be kept fully abreast of the times; it should be adequately supported, and every effort should be made to procure a staff of the highest ability.

The station has now a large and valuable collection of scientific reports exposed to great danger from fire, which will be much better cared for when a new fireproof library is erected for the college.

It will be equally benefited by the new chemical laboratory which the college needs, where the varied chemical tests employed in research work can be carried on more advantageously.

THE EXTENSION SERVICE.

The extension service has been criticized for attempting too much and expanding too much; for not properly economizing the time and force of its teachers; and for not co-ordinating sufficiently its work with other educational agencies. On the other hand, it has been highly commended. Numerous letters have been received from rural communities and from farmers testifying to the valuable work it has accomplished in these communities, and the aid it has given to individual farmers. Many instances might be cited where unproductive farms have been made productive, and where farmers have been taught how to manage their farms more economically and efficiently. There is abundant evidence to show that the extension service has contributed much to the betterment of the farmer, and has largely increased the agricultural wealth of this State.

For this valuable work due credit should be given to the extension service, but the Commission, as a result of its investigations, is forced to the conclusion that there has not been always sufficient consideration of other agencies seeking the same end, and that, with the best of intentions, there has been at times a tendency to exercise an authority which has aroused the opposition of those interested in the same work who felt they were not properly consulted, and that individual initiative and generosity were sometimes repressed by the failure of the college to recognize sufficiently the importance of securing their hearty co-operation. In the report of the extension service for 1916 the following sentence can probably be fairly taken as a statement of the present conception of the function of the extension service: —

The college, through its extension service, will in time function more and more as an organizer and administrator of large, State-wide movements designed to affect the rural life of the State.

This appears to the Commission to represent an undertaking that may well lie beyond the resources and the proper ambition of this service to accomplish. A considerable number of move-

ments designed to affect in some measure rural life may well be regarded as belonging to other agencies than the college to organize and administer.

The Commission believes that the most logical and the most beneficial service the extension department has rendered has been in helping farmers in the improvement of agricultural methods. It recommends that it keep as closely as possible to that form of service.

The rural problem, which it is the professed policy of the college to solve, seems only an integral part of that more comprehensive human problem which confronts men everywhere, to which the State, the church and various social institutions are seeking to give the right answer, and to which the right answer can only be given by their united efforts.

RELATION TO THE STATE BOARD OF AGRICULTURE.

Among the duties assigned your Commission was that of ascertaining to what extent some of the State bureaus working in this field could be co-ordinated in order that duplications might be eliminated and their work better systematized. This Commission found that three years ago there was organized for the same purpose a voluntary committee known as the Massachusetts Agricultural Development Committee, consisting of seven members, representing the agencies interested in agricultural advancement supported by the State, as well as the State granges, and that this committee had already done a large amount of useful work in outlining plans for closer co-operation between them. Partly, in consequence of the suggestions and recommendations of this committee, the following articles were agreed upon by the State Board of Agriculture and the Massachusetts Agricultural College:—

- I. The State Board of Agriculture and the Massachusetts Agricultural college are, or should be, regarded as public agencies, to be supported by public funds and to be subject to appropriate State control.
- II. The chief function of the State Board of Agriculture is administrative.
- III. The chief function of the State Agricultural College is educational.

- IV. There should be a standing joint committee on co-operation and adjustment, comprised of two or more members of the Board of Agriculture and a similar number from the Board of Trustees of the college, in addition to the secretary of the Board and the president of the college.
- V. There should be distinct written agreements on the form and method of division of labor in all cases where there is, in the opinion of either institution, any overlapping or duplication of work.
- VI. It is understood that in the matter of employment of members of the college staff as executive officers in the control of other work of the Board there will be definite agreements between the Board and the college.

The Commission approves of these articles of the agreement, and would make them more comprehensive and authoritative.

BOARD OF AGRICULTURAL CO-ORDINATION.

The Commission therefore recommends that as soon as practicable after the reorganization of those agricultural agencies — which the recent anti-aid amendment to the Constitution seems to necessitate — a Board of Agricultural Co-ordination be established by legislative action, whose duty it shall be to correlate the agricultural agencies of the Commonwealth, to supervise their respective publications, to prevent overlapping, and to secure the greatest efficiency and economy in their work.

The Commission also recommends in the reorganization of the Board of Agriculture, that the work of the Board be solely administrative, and include all the other departments which have anything to do with the field of agriculture, such as the Forestry Department and the Bureau of Animal Industry.

MATERIAL NEEDS OF THE COLLEGE.

Financial Support.

The first need of the college is permanent and adequate financial support. All the other problems with which it is confronted can only be solved satisfactorily if requisite means are provided to meet the expense which their solution involves. Inadequate support means poor teachers, poor buildings, poor equipment, a second or third rate institution. The Massachusetts Agricultural College is no exception to this law. It will

probably prove one of the most expensive institutions which the State maintains if it is to repay the State for its investment, and it will grow more expensive the better instruction it gives. Its expenses will also be greater than other land-grant colleges because it has no connection with a State university. An increasing number of students will also add to the expense of maintenance, while the tuition is free or less than cost.

Four methods of supporting the college have come under the attention of the Commission. These are —

First. — Annual appropriations based on estimates made directly to the Legislature.

Second. — Continuing appropriations, specific in amount, to cover a definite series of years or until revoked.

Third. — Millage appropriations based on a fractional amount of the State's valuation, increasing with the resources of the State and with the needs of the college.

Fourth. — Appropriations based upon a budget which considers in advance of legislative action the requirements of all departments and institutions, and makes comparison of their relative need on the one hand, and of the anticipated income of the State on the other.

It is clear that it is desirable, from the point of view of the college, that its income may be so insured as to make possible the arrangement of a program of development for more than one year at a time. From the point of view of the State, and consistently with a sound public policy, it is desirable that the expenditures of the trustees be kept within reasonable check and control of the Legislature.

Of the foregoing methods the first appears to be objectionable both to the college and to the Legislature. It prevents the trustees from knowing sufficiently in advance what means they will have for the development of their plans, and it has apparently proven wasteful of the time of college authorities and of legislators in the annual review and discussion of the various proposals.

The second plan, more acceptable than the first to the college, is objectionable from a legislative viewpoint because it implies a fixed agreement to which succeeding Legislatures may properly feel that they have without warrant been bound. Moreover, when such continuing appropriations are made for

a fixed period of time there is almost certain to be, at the end of the period, the kind of discussion of the college and its conduct that is not beneficial to it.

The third method adopted by seventeen States, and, according to testimony presented to this Commission, generally acceptable both to colleges and to Legislatures, fixes in the statute a fractional or millage basis for the support of the college.

The advantage of this plan is that to a degree it affords assurance of a certain relatively fixed income, increasing with the advancing valuation of the State and with the developing needs of the college. It is not open to the objection that succeeding Legislatures are bound by it, since there is no time limit fixed as to the application of any given ratio. Any Legislature may without violating any agreement alter the basis of the appropriation. It is taken for granted that, with the acceptance of the terms of the Federal laws and the establishment of the college, responsibility for some measure of support will be assumed. Only the form and extent of future development and the amount of support remain as subjects for legislative consideration.

The assessed valuation of the real and personal property of the State, subject to taxation, is now about \$5,000,000,000, and the annual increase in recent years has been about \$150,000,000. An appropriation of a sum equivalent to twelve one-hundredths of a mill would therefore insure a present income of about \$600,000, — a sum actually needed for buildings and maintenance, with steady and proportional increase to satisfy the future development of the college. While this method is called a millage tax, it is not really a separate tax upon the property of the Commonwealth, but merely a convenient method for determining, in the light of the present and prospective condition of the college, the annual appropriations which it would probably require for buildings, land and maintenance. In a State like Massachusetts that sum seems likely to remain fairly constant, neither giving too much nor too little to meet the college necessities.

The present continuing appropriation for maintenance would give the college in 1918 an appropriation of approximately \$362,000 from the State. Assuming that an annual increase

of 5 per cent over the expenses of the preceding year is a fair value on which to figure, the amount required for maintenance would increase by approximately \$20,000 a year.

The balance of \$600,000 a year would be needed for buildings and other improvements.

Of the first three methods the Commission believes the third to be the most advantageous to the college, as well as most likely to remove that difficulty of which complaint has been made by members of the Legislature; that is, that the college authorities spend too much time each year in urging before the Legislature the needs of the college.

It might be well worth the consideration of the Legislature whether this principle might be extended so as to provide a basis of support for all expenditures of the State for educational purposes. This would apply to the State a principle already authorized by State law for the support of education in Boston and certain other cities. Such a general appropriation would of course be apportioned to the various educational institutions and undertakings of the State according to a ratio established by the Legislature, and should be accounted for annually to the Legislature through a single department.

The fourth method — that of the general budget — provides a means for a careful study each year of the anticipated income of the State, on the one hand, and for a comparison and weighing of the needs and requirements of departments and institutions on the other. It is presumed that by this method much more time can be given than during a legislative session to inquiring into the merits of different proposals, and to analyzing each with reference to the others. Institutions would be expected to present their plans not only for the immediate present but for the future. Such a plan carefully worked out and justly administered would be of great merit. In the event of the adoption of the budget plan the Commission sees no sufficient reason why the Massachusetts Agricultural College should not be included in its operation.

In the appendix are two bills submitted by the Commission for the consideration of the Legislature. These are suggestive of the second and third plans above mentioned. The proposed budget plan is also before the Legislature, having been presented from another source.

An examination of the business of the college shows the fact that its accounts are well conducted. Although there is great complexity and a large amount of bookkeeping work necessary, the treasurer has adopted those methods employed by individuals or corporations to prevent inaccuracy or fraud, which are recognized as essential in the conduct of ordinary business affairs.

The work of the military department is carefully inspected yearly by a representative of the War Department; the military work is conducted in accordance with programs made by the War Department; and the institution is required to give satisfactory evidence that the requirements are being carried out in a manner satisfactory to the War Department.

At the same time, the trustees should be given more of the freedom accorded to trustees of other colleges, and not be prevented by too complicated restrictions from purchasing land, or expending their funds, most advantageously for the interests of the college and the Commonwealth.

The following table shows certain figures compiled for the year 1914 in relation to the support of higher education by certain States, which can be compared in a general way with the population and resources in Massachusetts: —

Rank.	STATE.	Popula- tion.	Approximate Taxable Wealth.	Total Appropri- ation.	For Buildings.
1	Minnesota,	2,080,000	\$1,700,000,000	\$2,362,000	\$897,000
2	Illinois,	5,640,000	2,500,000,000	2,286,000	-
3	Wisconsin,	2,340,000	3,300,000,000	2,154,000	343,600
4	Iowa,	2,225,000	900,000,000	1,705,000	216,000
5	Kansas,	1,691,000	2,900,000,000	1,704,000	100,000
6	Michigan,	2,810,000	2,800,000,000	1,658,000	325,000
7	California,	2,380,000	3,300,000,000	1,575,000 ¹	220,000
8	Missouri,	3,300,000	1,700,000,000	974,000	329,000
9	Ohio,	4,770,000	7,800,000,000	954,000	376,000
10	Washington,	1,420,000	1,000,000,000	875,000	
11	New York, ...	9,200,000	12,000,000,000	765,000 ¹	275,000
12	Pennsylvania,	7,670,000	6,700,000,000	536,690	147,246
13	Massachusetts, . .	3,605,000	4,645,000,000	280,000	87,500

¹ Cornell University in New York and the University of California have also large endowment funds.

The foregoing figures show conclusively that Massachusetts has not in comparison with other States been taxed excessively for the support of higher education.

At the present time the United States is doing more than any other country to develop agriculture, and if the State is to have an agricultural college it ought to keep it in first-class condition and not allow it to depreciate for lack of adequate support.

Buildings.

The first buildings of the college were cheaply constructed, with little provision for its future growth. An agricultural college was a new enterprise, and was generally viewed with distrust and often with derision. Legislators, accordingly, were not willing to grant larger appropriations than seemed absolutely necessary to comply with the conditions of the Federal grants. The college had to prove its worth in order to secure an adequate support. Consequently, after nearly fifty years of organized work, it finds itself seriously hampered by the narrow conceptions of its mission which prevailed at its origin. All the buildings which were first erected have been outgrown and most of them worn out. No stone or brick buildings chiefly for instruction purposes were built until 1899. During the last few years some good buildings have been erected, but other important buildings are now imperatively needed.

Library.

An adequate library is to-day recognized as one of the requisites of a higher institution of learning. All departments of instruction are virtually dependent upon it for support. To its teachers and students alike must go for mental inspiration and instruction. It should be made a place especially attractive to students, where they can find commodious reading rooms and have easy access to the most valuable books. It must make provisions for the storage and for future accumulation of books. If well arranged it grows more valuable every year. The Agricultural College is in serious need of such a building. Its valuable collection of about 53,000 volumes is not safely nor properly housed. They are crowded in the cellar and lower

story of a building originally designed for a small chapel and entirely unsuited for library purposes. The books are injured by the dampness of the cellar. They are in constant danger of fire, and many of them are so inaccessible they are of little use either to teachers or students. Various plans have been suggested to remodel the building and to add to its capacity, but none of them has been satisfactory, and it seems poor economy to spend a large sum of money in remodeling a building which might better be devoted to some other purposes, and which would not meet the needs of the college if it were temporarily enlarged.

An adequate library building is, at present, one of the greatest material needs of the college, and, judging from the amount expended by other colleges, the appropriation of \$250,000 does not seem excessive.

Chemistry Building.

An adequate chemical laboratory is equally needed. Chemistry is a basal science in agricultural instruction and investigation. More than any other science, it contributes to our knowledge how to make the earth produce the best and most abundant foods. It cannot be taught properly without well-equipped and ample laboratories and lecture rooms. The present chemical building is one of the oldest, most dilapidated and most unsuitable buildings on the campus. It was originally built for miscellaneous uses. With the growth of the college the rooms have become altogether too small to accommodate students, and the equipment is too meager and antiquated for instruction and research. It is constantly exposed to fire from the inflammable materials stored in it. It lacks space, light and ventilation. The time of students and teachers is wasted in the constant effort to overcome its deficiencies. There is no college in the Commonwealth which is not better supplied with facilities for chemical instruction. The erection is recommended, therefore, of a commodious and fireproof building, furnished with the best facilities for chemical instruction and research.

Gymnasium and Armory.

The gymnasium and armory are entirely inadequate for their purpose, and ought to be replaced at the earliest moment with a building suitably designed for this important part of the educational work of the institution.

Both to meet the Federal requirements for military tactics and to provide means for the physical development of the students, the trustees should be empowered to provide a suitable gymnasium and armory.

Dormitories.

The time has apparently come for the adoption of a dormitory system which shall be commensurate with the needs of the college, and it is recommended, therefore, that the trustees be empowered to make arrangements for such a system. The increasing number of women who enter the college makes the need of a dormitory for their accommodation more and more desirable.

With reference to all the buildings thus recommended the Commission considers it beyond its province to determine either the cost or the plans of such buildings as are named. These should be determined by the trustees after consultation with the faculty, with competent architects, with appropriate experts, and with responsible building contractors.

In the present abnormal prices of building construction and labor it seems better to postpone for the present the beginning of this building program.

Heating Plant.

The central heating plant of the college was installed when the dominant policy was to expend as little as possible for the maintenance of State institutions. Engineers also were not as experienced then as now in the distribution of heat. While, therefore, the location of the plant is admirable, the conduits for the pipes were too cheaply constructed, and the entire system of distribution should be changed so that the pipes can be more accessible and less heat wasted. This change is recommended by expert engineers, and although it will be an expen-

sive work, in the end it will prove more economical. In the judgment of your Commission the work is imperative and should be undertaken without unnecessary delay.

In locating new buildings more attention should be given to their location with reference to economical distribution of heat.

The plan which has been adopted by the college in recent years in erecting buildings that are fireproof and capable of enlargement is approved.

Repairs.

There is evidence that the appropriations for annual repairs and for keeping the equipment in order have not been sufficient, and it is clear that expenditures for these purposes must be made larger to protect the interests of the Commonwealth and to preserve the property it has already acquired.

The Farm.

The farm includes improved land, pasture land and a farm woodlot. The improved farm is used to show the best method of cultivation, how varieties of soil should be cultivated, and the best known methods for the maintenance of fertility. The farm is under the general supervision of the department of farm administration, and is insufficiently equipped with buildings and machinery suitable for its work. An appropriation should be made to procure the best agricultural equipment.

Student Labor.

It is the general testimony of agricultural colleges that hired labor is more economical than student labor. Many of the students, however, are hired to do some of the work in order that they may pay the expense of their education. The number of students employed during the year 1915-16 was 160 for ten months, and the amount of money paid to them was approximately \$25,000. The average number of skilled and unskilled laborers, including farmhands employed, was 70 per month, and the amount paid to them was \$67,000.

In the management of the farm there are two often conflicting policies, — the educational and the commercial. If the dominant policy be educational there may be less commercial

profit; if the dominant policy be commercial it becomes of less educational benefit. The Commission recommends that the dominant policy in all cases should be educational, although when it is educational the farm does not pay its expenses. The disbursements during the last fiscal year were \$35,143.56, and the receipts only \$28,986.93, leaving a deficit of \$6,156.83. The produce of the farm which brings in the largest amount to the college is certified milk, which, during the year 1915-16, amounted to \$21,207.85. To secure this amount, however, milk is purchased from neighboring dairies for the supply of the dining hall. It seems better, even though it costs more, to supply the dining hall from the college dairy and dispose of the balance as may seem best.

While paid farm labor may be more economical, student labor should be employed sometimes for educational purposes and for giving the students more practical acquaintance with farming. It would not seem unreasonable to require every student to devote a certain portion of time gratuitously in return for the great expenditure the State is making for his benefit.

Live Stock.

The live stock on the farm, in the judgment of experts, is not of as high quality as it should be, and is inferior to the stock on some of the private farms in the State. If the cattle and the poultry are to be object-lessons to the students and farmers, then the State college should have the best that can be secured.

It would be an advantage if the State farms connected with the various charitable institutions could make exchanges of superior breeds of cattle and poultry for their mutual benefit.

Land.

Land is an indispensable requisite for an agricultural college, and as the college grows it will doubtless need additional land for demonstration and for the experiment station. If more land is needed for permanent use it is better to purchase it than to lease it, as the land under the cultivation of the college becomes all the time more valuable, and the college is at last obliged to pay for the very values which it creates.

If land is needed the trustees should have power given them to make purchases, subject to the approval of the Governor and Council, under the general provisions of the act which is recommended for giving the college an adequate financial support. It is better policy for the State to leave the purchase of land and the erection of the buildings to the trustees, and to hold them responsible for the wise expenditure of the funds with which they are intrusted.

DEVELOPMENT OF AGRICULTURAL RESOURCES OF THE COMMONWEALTH.

Massachusetts has a land area of approximately 8,000 square miles, or 5,000,000 acres, of which 1,164,501 acres are improved land in farms, or about 23 per cent of the land area of the State.

According to the thirteenth census of the United States the acreage of improved land remained practically stationary during the first years after the founding of the college, but in 1880 there began a general decline, until in 1910 the acreage of improved land was only about one-half what it was in 1880. The acreage of staple crops also fell off, and milch cows decreased from 200,650 to 131,276, a loss of 49,382. The decline was not peculiar to Massachusetts, and in some of the eastern States the decline has been even greater.

The chief causes of this decline in improved land are evidently the enormous increase in transportation facilities, so that staple crops can be brought from the west to the east more abundantly and at less cost than they can be raised here; the opening of vast areas of new land and the influx of great numbers of immigrants to occupy them; and the rapid development of manufacturing and mercantile interests in New England and the northeastern States, which has led many of the younger men to turn from farming to more profitable employments.

The Massachusetts college has already rendered valuable services in checking this decline — it was 22 per cent in 1890–1900, and only 9.9 per cent in 1900–10 — by teaching farmers how to adjust farming and the production of crops to the

changing economic conditions of modern life. The statistics of the same census show that where the acreage of cultivated land has fallen off in many instances, the yield and the value per acre has increased, and that while the number of cows has decreased their productivity has increased, so that in her dairy products Massachusetts stands high in comparison with other States.

It is difficult to get trustworthy statistics in reference to vegetable crops as a basis of comparison, but those which can be obtained show an increase of 25 per cent in the acreage of all vegetables except potatoes, and in the last decade an increase of 65 per cent in value, not including a large increase in tobacco.

The figures for the total value of all farm crops from 1899 to 1909 are as follows:—

	1899.	1909.	Increase (Per Cent).
Total value,	\$23,158,000 00	\$31,948,000 00	38
Per acre,	\$27 06	\$41 33	53
Per farm,	\$614 00	\$865 00	40

These statistics show that Massachusetts is holding her own in comparison with other eastern States in the value of her farm crops, as the result of more intelligent methods of cultivation. The college also has done much, and it can do more, to develop the agricultural resources of the State in directing the farmers into new lines of agriculture, such as market gardening, fruit growing, greenhouse products, and in showing them how, by adopting new methods of fertilization and cultivation, the productivity of their farms can be largely increased. Farming in these days and in this region cannot be carried on profitably by old-fashioned methods. It must have the benefit of that advanced scientific and technical agriculture which the Massachusetts college was established to give.

It is also the province of the college to forecast these economic changes, and to teach the farmers how to readjust their work most profitably to the new conditions, and to give them the benefit of the knowledge gained through the researches of

its experiment station. The extension of this knowledge seems to the Commission to give to the extension service of the college the amplest and the most distinctive field for its exercises.

At present Massachusetts produces only about 25 per cent of the food it consumes. By the application of scientific methods the productivity of its arable land can be increased manifold.

Does the College meet the Agricultural Needs of the Commonwealth?

The Commission has been asked to determine whether "the college is meeting in the fullest degree the needs of the Commonwealth in respect to agricultural training." No college in any State does this. None have faculties of instruction, material equipment and endowments to which superlative epithets can properly be applied. In them all deficiencies and mistakes may be found. The Massachusetts college is no exception to the general rule. Nevertheless, within fifty years, in spite of manifold hindrances, it has succeeded in attaining an honorable place among the land-grant colleges. It is put in the first class by the United States Bureau of Education in the classification of colleges of all kinds.

The Massachusetts college is no longer a doubtful experiment. It has proved its worth by adding largely to the agricultural wealth of the Commonwealth.

The Production of Food.

The question of an abundant food supply is fast becoming one of the most urgent and serious questions in political economy to which all nations are giving unusual attention. The European war illustrates on a large scale how powerless a nation is without abundant food, and how starvation is one of the most effective weapons in overcoming an adversary. That question will become still more urgent as our population increases and the supply of arable land diminishes. By intelligent agriculture a nation can make the best preparation both for peace and war.

Our Federal government is already recognizing this fact, and within the last few years has enacted a number of laws designed to promote agricultural interests.

This Commonwealth ought not to lag behind other States in carrying on this important work, but should continue to foster and to maintain an institution which has been organized to supply more abundantly the primal need of its inhabitants.

To enable it to discover and to teach those methods whereby farm life may become more productive and more attractive, and to increase the number of intelligent citizens, the Massachusetts Agricultural College deserves the constant and the generous support of the General Court.

L. CLARK SEELYE, *Chairman.*

PAYSON SMITH, *Secretary.*

CHARLES E. BURBANK.

WARREN C. JEWETT.

WILLIAM F. WHITING.

JAN. 29, 1918.

APPENDIX.

RESOLVE TO PROVIDE FOR THE MAINTENANCE OF THE MASSACHUSETTS AGRICULTURAL COLLEGE.

1 *Resolved*, That the trustees of the Massachusetts Agricul-
 2 tural College are hereby authorized to expend annually for
 3 the expenses of said college — including administration, in-
 4 struction, investigation, extension teaching, and general main-
 5 tenance and repairs; and for the erection of new buildings,
 6 for sundry improvements, for additional equipment, and for
 7 the purchase of land — a sum of money equivalent in amount
 8 to twelve one-hundredths of one mill for each dollar of the
 9 total assessed valuation of real estate and tangible personal
 10 property in the commonwealth, subject to local taxation, as
 11 reported in accordance with existing provisions of law to the
 12 tax commissioner of the commonwealth. Payment shall be
 13 made to the treasurer of the college in four equal installments,
 14 each on the first day of December, March, June and Septem-
 15 ber in each year.

16 No land shall be purchased, nor shall any contract for the
 17 erection of a new building estimated to cost more than two
 18 thousand dollars be made by said trustees except with the
 19 approval of the governor and council. Before requesting the
 20 approval of the governor and council of any contract for the
 21 erection of a new building, said trustees shall submit to them
 22 complete architects' plans and specifications for such building,
 23 together with estimates of cost obtained from three inde-
 24 pendent, reliable contractors.

25 A complete statement of all expenditures made under this
 26 resolve shall be submitted in the annual report of the trustees
 27 of the Massachusetts Agricultural College.

AN ACT TO PROVIDE FOR THE MAINTENANCE OF THE MASSACHUSETTS AGRICULTURAL COLLEGE.

Be it enacted, etc., as follows:

1 SECTION 1. The trustees of the Massachusetts Agricultural
 2 College are hereby authorized to expend for the current ex-
 3 penses of said college — including administration, instruction,

4 investigation, extension teaching, and general maintenance
5 and repairs; and for the erection of new buildings, for sundry
6 improvements, for additional equipment, and for the purchase
7 of land — the following sums: —

8 For the year nineteen hundred and nineteen, a sum not
9 exceeding five hundred and ninety thousand dollars.

10 For the year nineteen hundred and twenty, a sum not
11 exceeding six hundred and nineteen thousand dollars.

12 For the year nineteen hundred and twenty-one, a sum not
13 exceeding six hundred and fifty thousand dollars.

14 For the year nineteen hundred and twenty-two, a sum not
15 exceeding six hundred and eighty-two thousand dollars.

16 For the year nineteen hundred and twenty-three, a sum
17 not exceeding seven hundred and sixteen thousand dollars.

1 SECTION 2. There shall be allowed and paid out of the
2 treasury of the commonwealth to the trustees of the Massa-
3 chusetts Agricultural College the sums provided for in section
4 one of this act, payments to be made in four equal install-
5 ments each on the first day of December, March, June and
6 September in each year.

1 SECTION 3. No land shall be purchased, nor shall any con-
2 tract for the erection of a new building estimated to cost
3 more than two thousand dollars be made by said trustees ex-
4 cept with the approval of the governor and council. Before
5 requesting the approval by the governor and council of any
6 contract for the erection of a new building, said trustees shall
7 submit to them complete architects' plans and specifications
8 for each building, together with estimates of cost obtained
9 from three independent, reliable contractors.

1 SECTION 4. The books and accounts of the Massachusetts
2 Agricultural College shall be audited as may be prescribed by
3 law. A complete statement of all expenditures made under
4 this act shall be submitted in the annual report of the trustees
5 of the Massachusetts Agricultural College.

1 SECTION 5. This act shall take effect December one,
2 nineteen hundred and eighteen.

